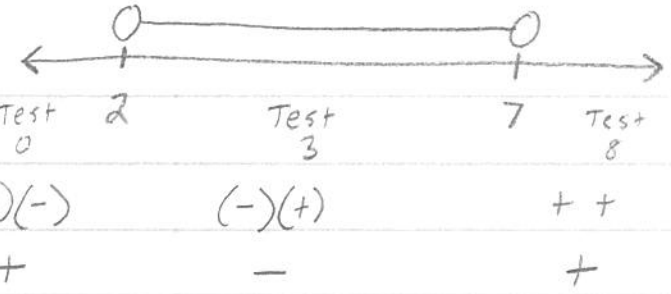
Review Sheet for Exam 1 Answer Key

Be Sure to Study Your Notes and Homeworks

1) $x^2 - 9x + 14 < 0$

$(x-7)(x-2) < 0$

7 2 ↓ negatives



SB: $\{x \mid 2 < x < 7\}$

Int: $(2, 7)$

2) $4 - 3x \leq -(1 + 8x)$

$4 - 3x \leq -1 - 8x$

$-4 + 8x \quad -4 + 8x$

$\frac{5x}{5} \leq \frac{-5}{5}$

$x \leq -1$

SB: $\{x \mid x \leq -1\}$

Int: $(-\infty, -1]$

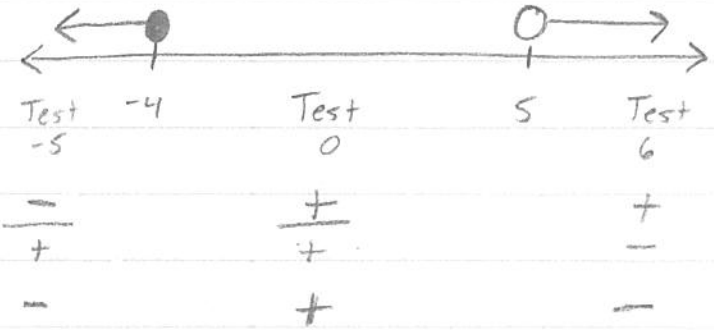
3) $\frac{x+4}{5-x} \leq 0$

$x + 4 = 0$ $\quad$ $5 - x = 0$

$x = -4$ $\quad$ $-x = -5$

$x = 5$

negative $\quad$ open circle



SB: $\{x \mid x \leq -4 \cup x > 5\}$

Int: $(-\infty, -4] \cup (5, \infty)$

4) $\frac{3x}{2} \leq \frac{3x-6}{4}$

$\frac{3x}{2} - \frac{3x-6}{4} \leq 0$

LCD 4: $\frac{2(3x)}{4} - \frac{3x-6}{4} \leq 0$

$\frac{6x}{4} - \frac{3x-6}{4} \leq 0$ ← negatives

$\frac{3x+6}{4} \leq 0$

$3x + 6 = 0$

$-6 \quad -6$

$\frac{3x}{3} = \frac{-6}{3}$

$x = -2$

$\frac{-}{+}$ $\quad$ $\frac{+}{+}$

$-$ $\quad$ $+$

SB: $\{x \mid x \leq -2\}$

Int $(-\infty, -2]$

5) $x^2 + 4x < 0$

$x(x+4) < 0$

$0 \quad -4$ ↓ negatives

$(-)(-)$ $\quad$ $(-)(+)$ $\quad$ $(+)(+)$

$+$ $\quad$ $-$ $\quad$ $+$

SB: $\{x \mid -4 < x < 0\}$

Int: $(-4, 0)$

6) $1 + \frac{2}{x+1} \leq \frac{2}{x}$

LCD $x(x+1)$

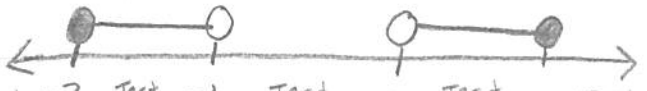
$\frac{x(x+1)}{x(x+1)} + \frac{2x}{x(x+1)} \leq \frac{2(x+1)}{x(x+1)}$

$\frac{x^2 + x + 2x - (2x+2)}{x(x+1)} \leq 0$

$\frac{x^2 + x - 2}{x(x+1)} \leq 0$

$\frac{(x+2)(x-1)}{x(x+1)} \leq 0$ ← negative

$-2, 1, 0, -1$



$\frac{(-)(-)}{(-)(-)}$ $\quad$ $\frac{(+)(-)}{(-)(-)}$ $\quad$ $\frac{(+)(-)}{(-)(+)}$ $\quad$ $\frac{(+)(-)}{(+)(+)}$ $\quad$ $\frac{(+)(+)}{(+)(+)}$

$+$ $\quad$ $-$ $\quad$ $+$ $\quad$ $-$ $\quad$ $+$

SB: $\{x \mid -2 \leq x < -1 \cup 0 < x \leq 1\}$

Int: $[-2, -1) \cup (0, 1]$

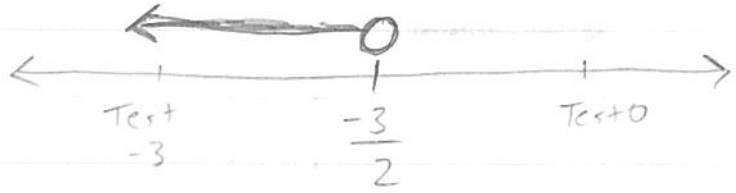
7) $\frac{4x}{2x+3} > 2$

$\frac{4x}{2x+3} - 2 > 0$

$\frac{4x}{2x+3} - \frac{2(2x+3)}{2x+3} > 0$

$\frac{4x - (4x+6)}{2x+3} > 0$

$\frac{-6}{2x+3} > 0$ ← positive



$2x+3=0$
-3

$\frac{2x}{2} = \frac{-3}{2}$

$x = -\frac{3}{2}$

	$\frac{-}{-}$	$\frac{-}{+}$
	$+$	$-$

SB: $\{x \mid x < -\frac{3}{2}\}$

Int: $(-\infty, -\frac{3}{2})$

8) $\frac{x+1}{x} < 3$

$\frac{x+1}{x} - 3 < 0$

$\frac{x+1}{x} - \frac{3x}{x} < 0$

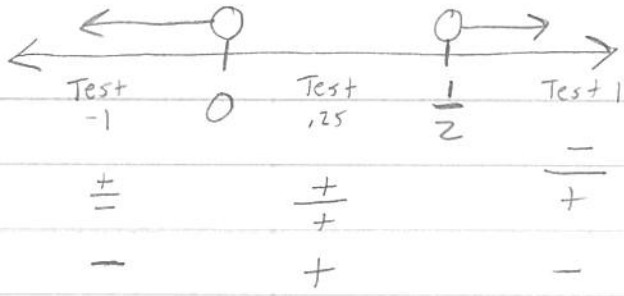
$\frac{-2x+1}{x} < 0$

$-2x+1=0 \quad x=0$

$-1 \quad -1$

$-2x = -1$

$x = \frac{1}{2}$



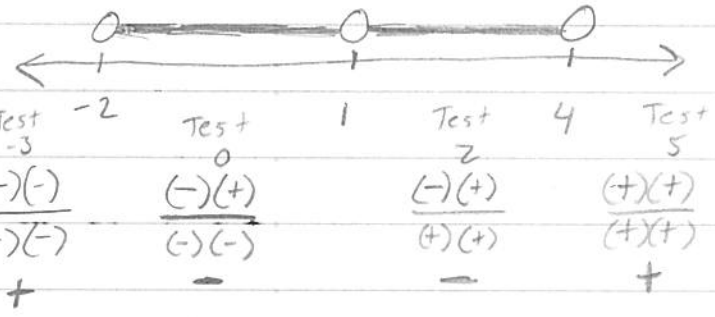
SB: $\{x \mid x<0 \text{ U } x>\frac{1}{2}\}$

Int: $(-\infty, 0) \cup (\frac{1}{2}, \infty)$

9) $\frac{x^2-2x-8}{(x-1)^2} < 0$ ← negatives

$\frac{(x-4)(x+2)}{(x-1)(x-1)} < 0$

$x=4 \quad x=-2 \quad x=1$



SB: $\{x \mid -2<x<1 \text{ or } 1<x<4\}$

Int: $(-2,1) \cup (1,4)$

10) $56x^3 - 28x^2 + 7x$

$\boxed{7x(8x^2-4x+1)}$

11) $x^3 - 3x^2 - 4x + 12$

$x^2(x-3) \mid -4(x-3)$

$(x-3)(x^2-4)$

$\boxed{(x-3)(x+2)(x-2)}$

12) $3x^2 - 75$

$3(x^2 - 25)$

$\boxed{3(x+5)(x-5)}$

13) $ax^2 + 15 - 5ax - 3x$ ← switch the order

$ax^2 - 5ax \mid -3x + 15$

$ax(x-5) \mid -3(x-5)$

$\boxed{(ax-3)(x-5)}$

14) $6x^2 - 11x - 10$

$(6)(-10) = -60$

-60	
-1	60
-2	30
-3	20
-4	15
-5	12
-6	10
-10	6
-12	5
-15	4

$6x^2 - 15x + 4x - 10$

$3x(2x-5) \quad 2(2x-5)$

$\boxed{(2x-5)(3x+2)}$

15) $a^8 - b^8$

$(a^4 - b^4)(a^4 + b^4)$

$(a^2 - b^2)(a^2 + b^2)$

$\boxed{(a-b)(a+b)(a^2+b^2)(a^4+b^4)}$

16) $x^2 - 8x + 4$

Not factorable

17) $x^4 - x^2 - 12$

Let $y = x^2$ $\quad y^2 - y - 12$

$(y-4)(y+3)$

$(x^2-4)(x^2+3)$

$\boxed{(x+2)(x-2)(x^2+3)}$

18) $16x^2 - 25$

$\boxed{(4x+5)(4x-5)}$

19) $x + 1 + y + xy$

$1(x+1) \mid +y(1+x)$

$\boxed{(x+1)(y+1)}$

20) $x^3 + 27$ SOAP

$(x+3)(x^2 - 3x + 3^2)$

$\boxed{(x+3)(x^2 - 3x + 9)}$

21) $8x^3 - 125y^3$

$\sqrt[3]{8x^3} = 2x$

$\sqrt[3]{125y^3} = 5y$

$(2x-5y)((2x)^2 + (2x)(5y) + (5y)^2)$

$\boxed{(2x-5y)(4x^2 + 10xy + 25y^2)}$